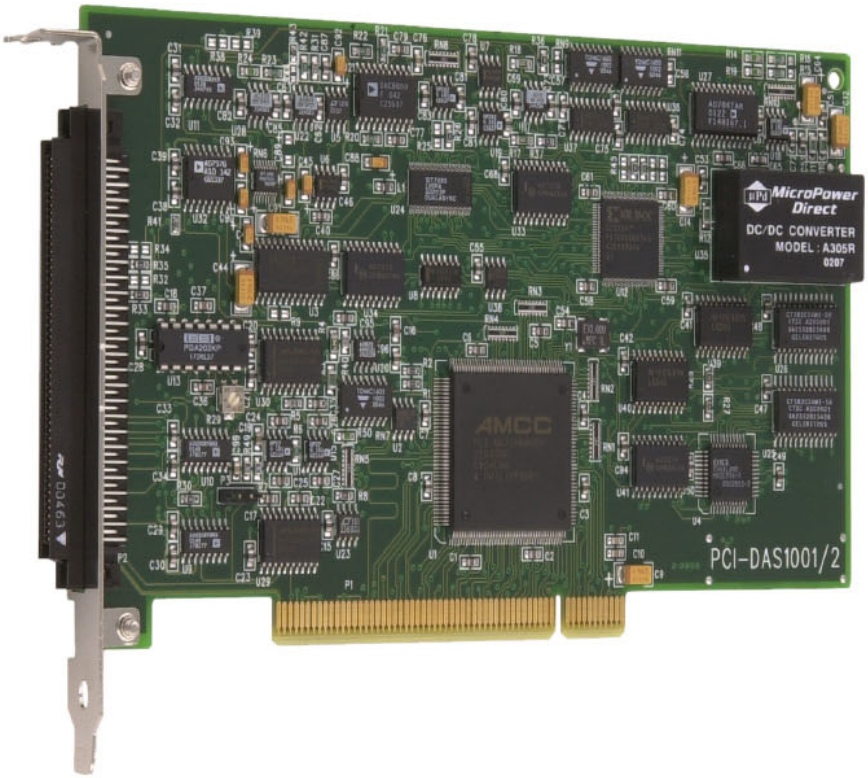
PCI-DAS1001

Multifunction Analog and Digital I/O

User's Guide



MEASUREMENT COMPUTING.

PCI-DAS1001

Multifunction Analog & Digital I/O

User's Guide

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About this User's Guide

What you will learn from this user's guide

This user's guide explains how to install, configure, and use the PCI-DAS1001 so that you get the most out of its analog, digital, and timing I/O features.

This user's guide also refers you to related documents available on our web site, and to technical support resources that can also help you get the most out of your board.

Conventions in this user's guide

For more information on …

Text presented in a box signifies additional information and helpful hints related to the subject matter you are reading.

Caution! Shaded caution statements present information to help you avoid injuring yourself and others, damaging your hardware, or losing your data.

<#:#> Angle brackets that enclose numbers separated by a colon signify a range of numbers, such as those assigned to registers, bit settings, etc.

bold text **Bold** text is used for the names of objects on the screen, such as buttons, text boxes, and check boxes. For example:
1. Insert the disk or CD and click the **OK** button.

italic text *Italic* text is used for the names of manuals and help topic titles, and to emphasize a word or phrase. For example:
The *Insta*Cal® installation procedure is explained in the *Quick Start Guide*.
Never touch the exposed pins or circuit connections on the board.

Where to find more information

The following electronic documents provide relevant information to the operation of your PCI-DAS1001.

- MCC's *Specifications: PCI-DAS1001* (the PDF version of the Electrical Specification Chapter in this guide) is available on our web site at www.mccdaq.com/pdfs/PCI-DAS1001.pdf.
- MCC's *Quick Start Guide* is available on our web site at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.
- MCC's *Guide to Signal Connections* is available on our web site at www.mccdaq.com/signals/signals.pdf.
- MCC's *Universal Library User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf.
- MCC's *Universal Library Function Reference* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-functions.pdf.
- MCC's *Universal Library for LabVIEW™ User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/SM-UL-LabVIEW.pdf.

PCI-DAS1001 User's Manual (this document) is also available on our web site at www.mccdaq.com/PDFmanuals/PCI-DAS1001.pdf.

Introducing the PCI-DAS1001

Overview: PCI-DAS1001 features

This manual explains how to install and use the PCI-DAS1001. This board is a multifunction analog and digital I/O board designed for the PCI bus.

The PCI-DAS1001 provides either 16 single-ended or eight differential analog inputs. Input ranges are software-selectable as either bipolar or unipolar.

Analog input ranges for the PCI-DAS1001 board are:

- Bipolar: ±10 V, ±1.0 V, ±0.1 V, ±0.01 V
- Unipolar: 0 to 10 V, 0 to 1.0 V, 0 to 0.1V, 0 to 0.01 V

The PCI-DAS1001 provides a 150 kHz sample rate.

The PCI-DAS1001 also provides two channels of 12-bit analog output. Analog output ranges are ±10 V and ±5 V (bipolar) and 0-10 V, 0-5 V (unipolar).

The PCI-DAS1001 offers 24-bits of parallel, digital I/O (two 8-bit ports and two 4-bit ports). You can configure each port independently as input or output.

This board has an 82C54 counter chip which has three user-accessible 16-bit counters. Clock, gate, and output signals from two of three counters are available on a 100-pin connector. The third counter is used internally.

The PCI-DAS1001 is fully plug-and-play. All addresses and interrupt channels are set with software.

Software features

For information on the features of *Insta*Cal and the other software included with your PCI-DAS1001, refer to the *Quick Start Guide* that shipped with your device. The *Quick Start Guide* is also available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Check www.mccdaq.com/download.htm for the latest software version or versions of the software supported under less commonly used operating systems.

PCI-DAS1001 block diagram

PCI-DAS1001 functions are illustrated in the block diagram shown here.

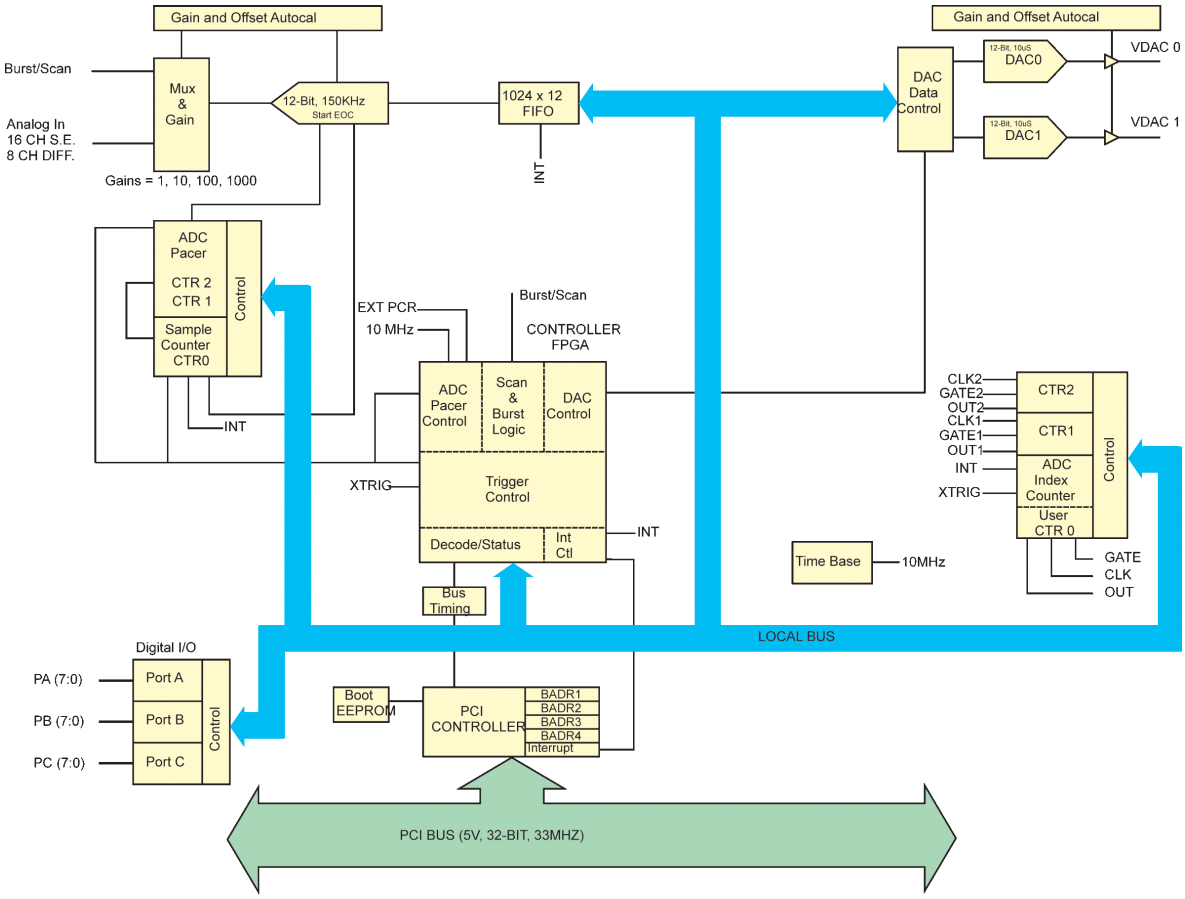


Figure 1-1. PCI-DAS1001 functional block diagram

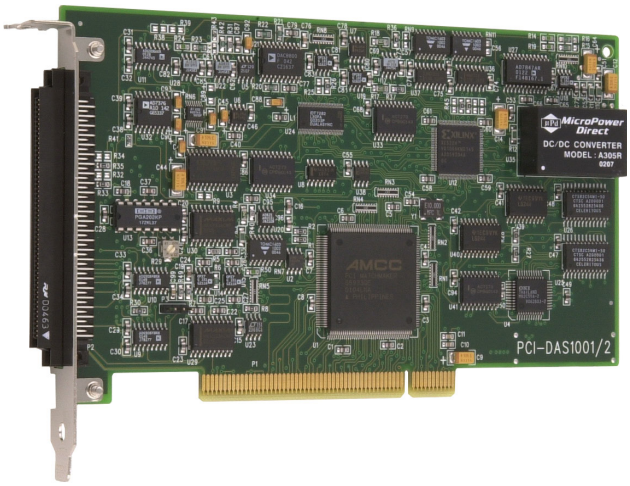
Installing the PCI-DAS1001

What is included with your PCI-DAS1001

As you unpack your board, make sure each of the items shown below is included:

Hardware

- PCI-DAS1001



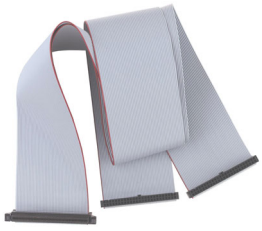
Additional documentation

In addition to this hardware user's guide, you should also receive the *Quick Start Guide* (available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf). This booklet supplies a brief description of the software you received with your PCI-DAS1001 and information regarding installation of that software. Please read this booklet completely before installing any software or hardware.

Optional components

If you ordered any of the following products with your board, they should be included with your shipment.

- C100FF-x cable



- Signal termination and conditioning accessories

  MCC provides signal termination and conditioning products for use with the PCI-DAS1001. Refer to the "Field wiring and signal termination" section for a complete list of compatible accessory products.

Unpacking the PCI-DAS1001

As with any electronic device, you should take care while handling to avoid damage from static electricity. Before removing the PCI-DAS1001 from its packaging, ground yourself using a wrist strap or by simply touching the computer chassis or other grounded object to eliminate any stored static charge.

If any components are missing or damaged, notify Measurement Computing Corporation immediately by phone, fax, or e-mail:

- Phone: 508-946-5100 and follow the instructions for reaching Tech Support.
- Fax: 508-946-9500 to the attention of Tech Support
- Email: techsupport@mccdaq.com

Installing the software

Refer to the *Quick Start Guide* for instructions on installing the software on the *Measurement Computing Data Acquisition Software CD*. This booklet is available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Installing the hardware

The PCI-DAS1001 board is completely plug-and-play. There are no switches or jumpers to set on the board. Configuration is controlled by your system's BIOS. To install your board, follow the steps below.

Install the MCC DAQ software before you install your board

The driver needed to run your board is installed with the MCC DAQ software. Therefore, you need to install the MCC DAQ software before you install your board. Refer to the *Quick Start Guide* for instructions on installing the software.

1. Turn your computer off, open it up, and insert your board into an available PCI slot.
2. Close your computer and turn it on.

   If you are using an operating system with support for plug-and-play (such as Windows 2000 or Windows XP), a dialog box pops up as the system loads indicating that new hardware has been detected. If the information file for this board is not already loaded onto your PC, you will be prompted for the disk containing this file. The MCC DAQ software contains this file. If required, insert the *Measurement Computing Data Acquisition Software* CD and click **OK**.
3. To test your installation and configure your board, run the *Insta*Cal utility you installed in the previous section. Refer to the *Quick Start Guide* that came with your board www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf for information on how to initially set up and load *Insta*Cal.

Allow your computer to warm up for at least 15 minutes before acquiring data with this board. The high speed components used on the board generates heat, and it takes this amount of time for a board to reach steady state if it has been powered off for a significant amount of time.

Configuring the hardware

All hardware configuration options on the PCI-DAS1001 are software controlled. You can select some of the configuration options using *Insta*Cal, such as the analog input configuration (16 single-ended or eight differential channels), and the source for the two independent counters. Once selected, any program that uses the Universal Library will initialize the hardware according to these selections.

Following is an overview of the available hardware configuration options for this board. There is additional general information regarding analog signal connection and configuration in the *Guide to Signal Connections* (available on our web site at www.mccdaq.com/signals/signals.pdf).

Differential input mode

When all channels are configured for differential input mode, eight analog input channels are available. In this mode, the input signal is measured with respect to the low input. The input signal is delivered through three wires:

- The wire carrying the signal to be measured connects to CH# IN HI.
- The wire carrying the reference signal connects to CH# IN LO.
- The third wire, typically a system ground, connects to LLGND.

Single-ended input mode

When all channels are configured for single-ended input mode, 16 analog input channels are available. In this mode, the input signal is referenced to the board's signal ground (LLGND). The input signal is delivered through two wires:

- The wire carrying the signal to be measured connects to CH# IN HI.
- The second wire connects to LLGND.

Connecting the board for I/O operations

Connectors, cables – main I/O connector

Table 2-1 lists the board connectors, applicable cables, and compatible accessory boards for the PCI-DAS1001.

Table 2-1 Board Connectors, cables, accessory equipment

Connector type	100-pin high density Robinson Nugent connector
Compatible cables	C100FF-x, unshielded ribbon cable. x = length in feet (Figure 2-1)
Compatible accessory products (with the C100FF-x cable)	ISO-RACK16/P ISO-DA02/P CIO-ERB08 (DADP-5037 adaptor required *) CIO-ERB24 (DADP-5037 adaptor required *) SSR-RACK08 (DADP-5037 adaptor required *) SSR-RACK24 (DADP-5037 adaptor required *) BNC-16SE BNC-16DI CIO-MINI50 (2 required) CIO-TERM100 (1 required) SCB-50 (1 required)
* Details on the DADP-5037 adaptor board are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=103&pf_id=1381.	

Pinout – main I/O connector

Table 2-2. 8-channel differential mode

Signal Name	Pin		Pin	Signal Name
GND	100	••	50	GND
N/C	99	••	49	N/C
N/C	98	••	48	PC +5V
N/C	97	••	47	N/C
N/C	96	••	46	N/C
A/D Int. Pacer Output	95	••	45	A/D External Trigger
N/C	94	••	44	N/C
N/C	93	••	43	N/C
PC -12V	92	••	42	A/D External Pacer
PC GND	91	••	41	CTR4 OUT
PC +12V	90	••	40	CTR4 GATE
PC GND	89	••	39	CTR4 CLK
N/C	88	••	38	D/A OUT 1
CTR5 OUT	87	••	37	D/A GND 1
CTR5 GATE	86	••	36	D/A OUT 0
CTR5 CLK	85	••	35	D/A GND 0
N/C	84	••	34	N/C
N/C	83	••	33	N/C
CTR6 OUT	82	••	32	N/C
CTR6 GATE	81	••	31	N/C
CTR6 CLK	80	••	30	N/C
N/C	79	••	29	N/C
N/C	78	••	28	N/C
N/C	77	••	27	N/C
N/C	76	••	26	N/C
N/C	75	••	25	N/C
FIRSTPORTC Bit 7	74	••	24	N/C
FIRSTPORTC Bit 6	73	••	23	N/C
FIRSTPORTC Bit 5	72	••	22	N/C
FIRSTPORTC Bit 4	71	••	21	N/C
FIRSTPORTC Bit 3	70	••	20	N/C
FIRSTPORTC Bit 2	69	••	19	N/C
FIRSTPORTC Bit 1	68	••	18	LLGND
FIRSTPORTC Bit 0	67	••	17	CH7 IN LO
FIRSTPORTB Bit 7	66	••	16	CH7 IN HI
FIRSTPORTB Bit 6	65	••	15	CH6 IN LO
FIRSTPORTB Bit 5	64	••	14	CH6 IN HI
FIRSTPORTB Bit 4	63	••	13	CH5 IN LO
FIRSTPORTB Bit 3	62	••	12	CH5 IN HI
FIRSTPORTB Bit 2	61	••	11	CH4 IN LO
FIRSTPORTB Bit 1	60	••	10	CH4 IN HI
FIRSTPORTB Bit 0	59	••	9	CH3 IN LO
FIRSTPORTA Bit 7	58	••	8	CH3 IN HI
FIRSTPORTA Bit 6	57	••	7	CH2 IN LO
FIRSTPORTA Bit 5	56	••	6	CH2 IN HI
FIRSTPORTA Bit 4	55	••	5	CH1 IN LO
FIRSTPORTA Bit 3	54	••	4	CH1 IN HI
FIRSTPORTA Bit 2	53	••	3	CH0 IN LO
FIRSTPORTA Bit 1	52	••	2	CH0 IN HI
FIRSTPORTA Bit 0	51	••	1	LLGND
PCI slot ↓				

Table 2-3. 16-channel single-ended mode

Signal Name	Pin		Pin	Signal Name
GND	100	••	50	GND
N/C	99	••	49	N/C
N/C	98	••	48	PC +5V
N/C	97	••	47	N/C
N/C	96	••	46	N/C
A/D Int. Pacer Output	95	••	45	A/D External Trigger In
N/C	94	••	44	N/C
N/C	93	••	43	N/C
PC -12V	92	••	42	A/D External Pacer
PC GND	91	••	41	CTR4 OUT
PC +12V	90	••	40	CTR4 GATE
PC GND	89	••	39	CTR4 CLK
N/C	88	••	38	D/A OUT 1
CTR5 OUT	87	••	37	D/A GND 1
CTR5 GATE	86	••	36	D/A OUT 0
CTR5 CLK	85	••	35	D/A GND 0
N/C	84	••	34	N/C
N/C	83	••	33	N/C
CTR6 OUT	82	••	32	N/C
CTR6 GATE	81	••	31	N/C
CTR6 CLK	80	••	30	N/C
N/C	79	••	29	N/C
N/C	78	••	28	N/C
N/C	77	••	27	N/C
N/C	76	••	26	N/C
N/C	75	••	25	N/C
FIRSTPORTC Bit 7	74	••	24	N/C
FIRSTPORTC Bit 6	73	••	23	N/C
FIRSTPORTC Bit 5	72	••	22	N/C
FIRSTPORTC Bit 4	71	••	21	N/C
FIRSTPORTC Bit 3	70	••	20	N/C
FIRSTPORTC Bit 2	69	••	19	N/C
FIRSTPORTC Bit 1	68	••	18	LLGND
FIRSTPORTC Bit 0	67	••	17	CH15 IN
FIRSTPORTB Bit 7	66	••	16	CH7 IN
FIRSTPORTB Bit 6	65	••	15	CH14 IN
FIRSTPORTB Bit 5	64	••	14	CH6 IN
FIRSTPORTB Bit 4	63	••	13	CH13 IN
FIRSTPORTB Bit 3	62	••	12	CH5 IN
FIRSTPORTB Bit 2	61	••	11	CH12 IN
FIRSTPORTB Bit 1	60	••	10	CH4 IN
FIRSTPORTB Bit 0	59	••	9	CH11 IN
FIRSTPORTA Bit 7	58	••	8	CH3 IN
FIRSTPORTA Bit 6	57	••	7	CH10 IN
FIRSTPORTA Bit 5	56	••	6	CH2 IN
FIRSTPORTA Bit 4	55	••	5	CH9 IN
FIRSTPORTA Bit 3	54	••	4	CH1 IN
FIRSTPORTA Bit 2	53	••	3	CH8 IN
FIRSTPORTA Bit 1	52	••	2	CH0 IN
FIRSTPORTA Bit 0	51	••	1	LLGND
PCI slot ↓				

Cables

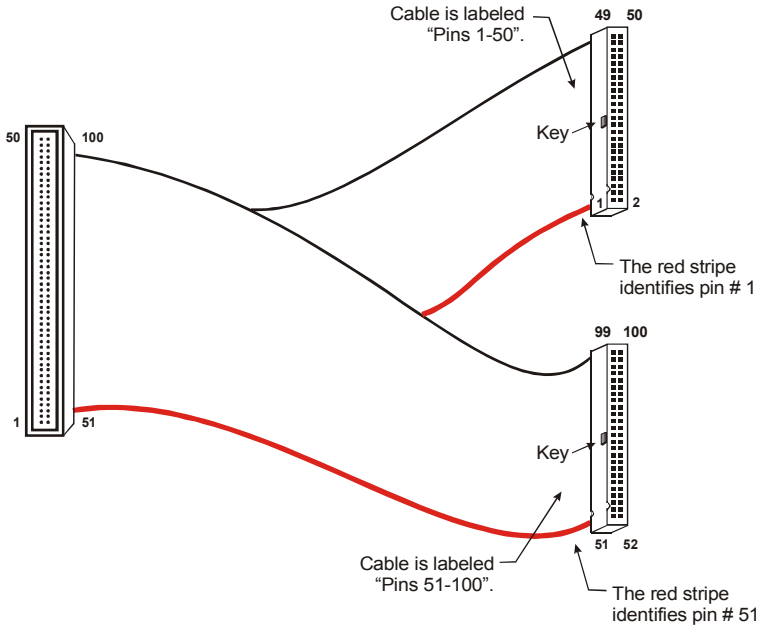


Figure 2-1. C100FF-x cable

Field wiring and signal termination

The following MCC screw terminal and signal conditioning boards are compatible with the PCI-DAS1001:

- **SCB-50** – 50-conductor, shielded signal connection box. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=196&pf_id=1168.
- **CIO-MINI50** – 50-pin universal screw terminal accessory. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=102&pf_id=258.
- **ISO-RACK16/P** – 16-channel isolation module mounting rack. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=127&pf_id=1111.
- **ISO-DA02/P** – Two-channel 5B module rack. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=128&pf_id=710.
- **BNC-16SE** – 16-channel single-ended BNC connector box. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=101&pf_id=713.
- **BNC-16DI** – Eight-channel differential BNC connector box. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=101&pf_id=714.
- **SSR-RACK24*** – 24-position solid state relay rack. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=122&pf_id=1193.
- **SSR-RACK08*** – Eight-channel solid state relay rack. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=122&pf_id=620.
- **CIO-ERB24*** – 24-channel electromechanical relay accessory for digital I/O boards. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=123&pf_id=241.
- **CIO-ERB08*** – Eight-channel electromechanical relay accessory for digital I/O boards. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=123&pf_id=241.

* The SSR-RACK24, SSR-RACK08, CIO-ERB24, and CIO-ERB08 boards require the **DADP-5037** PCI-DAS-to-37-pin SSR and ERB adapter. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=103&pf_id=1381

Programming and Developing Applications

After following the installation instructions in Chapter 2, your board should now be installed and ready for use. Although the board is part of the larger DAS family, in general there may be no correspondence among registers for different boards. Software written at the register level for other DAS models will not function correctly with your board.

Programming languages

Measurement Computing's Universal Library® provides access to board functions from a variety of Windows programming languages. If you are planning to write programs, or would like to run the example programs for Visual Basic® or any other language, please refer to the *Universal Library User's Guide* (available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf).

Packaged applications programs

Many packaged application programs, such as SoftWIRE® and HP-VEE™, now have drivers for your board. If the package you own does not have drivers for the board, please fax or e-mail the package name and the revision number from the install disks. We will research the package for you and advise how to obtain drivers.

Some application drivers are included with the Universal Library package, but not with the application package. If you have purchased an application package directly from the software vendor, you may need to purchase our Universal Library and drivers. Please contact us by phone, fax, or e-mail:

- Phone: 508-946-5100 and follow the instructions for reaching Tech Support.
- Fax: 508-946-9500 to the attention of Tech Support
- Email: techsupport@mccdaq.com

Register-level programming

You should use the Universal Library or one of the packaged application programs mentioned above to control your board. Only experienced programmers should perform register-level programming.

If you need to program at the register level in your application, refer to the *Register Map for the* PCI-DAS1001 *Series* (available at www.mccdaq.com/registermaps/RegMapSTC1000.pdf).

Calibrating the Board

Introduction

Calibrate the board using the *Insta*Cal utility after the board has fully warmed up. The recommended warm-up time is 15 minutes. For best results, calibrate the board immediately before making critical measurements. The high resolution analog components on the board are sensitive to temperature. Pre-measurement calibration ensures that your board is operating at optimum calibration values.

Calibration theory

PCI-DAS1001 series boards are shipped fully calibrated from the factory with calibration coefficients stored in nvRAM. When using Universal Library at run time, these calibration factors are loaded into system memory and are automatically retrieved each time a different DAC/ADC range is specified.

The analog input circuits are calibrated for both offset and gain (Figure 4-1).

- Offset calibration for the analog input is performed directly on the input amplifier (PGIA) with coarse and fine trim DACs acting on the amplifier.
- For input gain calibration, a precision calibration reference is used with coarse and fine trim DACs acting on the ADC.

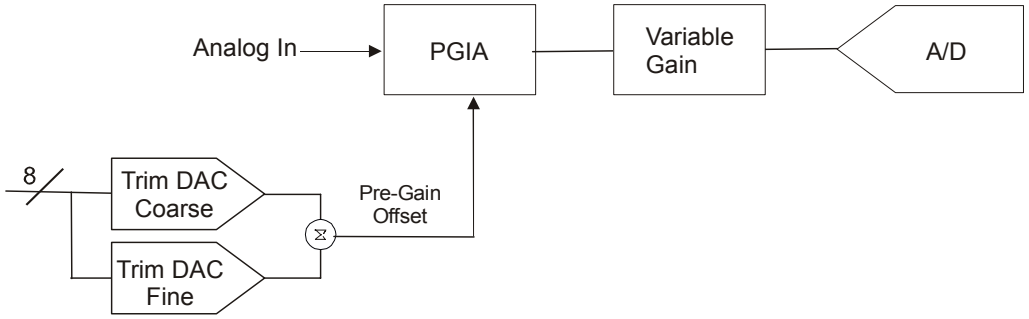


Figure 4-1. Analog input circuit calibration

The analog outputs are calibrated for both offset and gain (Figure 4-2). This circuit is duplicated for both DAC0 and DAC1.

- Offset adjustments are made in the output buffer section. The tuning range of this adjustment allows for max DAC and output buffer offsets.
- Gain calibration is performed via DAC reference adjustments.

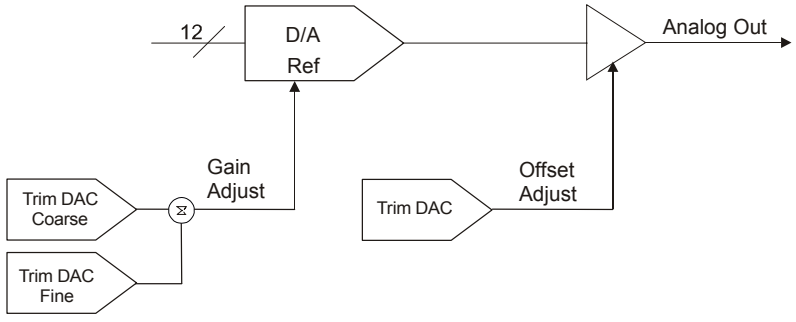


Figure 4-2. Analog output circuit calibration

Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Analog input

Table 1. Analog input specifications

Parameter	Specification
A/D converter type	*7800*
Resolution	12 bits
Number of channels	8 differential or 16 single-ended, software selectable
Input ranges	±10 V, ±1 V, ±0.1 V, ±0.01 V, 0 to 10 V, 0 to 1 V, 0 to 0.1 V, 0 to 0.01 V. Fully programmable
Polarity	Unipolar/bipolar, software selectable
A/D pacing	Programmable: internal counter or external source (A/D External Pacer, positive or negative edge selectable by software), or software polled
Burst mode	Software selectable option, rate = 6.67µs
A/D trigger sources	External digital (A/D External Trigger)
A/D triggering modes	Digital: Software enabled, rising edge, hardware trigger Pre-trigger: Unlimited pre- and post-trigger samples. Total # of samples must be > 512.
Data transfer	From 1024 sample FIFO via REPINSW, interrupt or software polled
A/D conversion time	*3 µs*
Throughput	150 kHz
Relative accuracy	±1.5 LSB
Differential linearity error	±0.75 LSB
Integral linearity error	±0.5 LSB typ, ±1.5 LSB max
Gain error (relative to calibration reference)	0.01 V range: ± 0.4% of reading, max All other ranges: ± 0.02% of reading, max
No missing codes guaranteed	*12 bits*
Calibration	Auto-calibration, calibration factors for each range stored on board in non-volatile RAM
Gain drift (A/D specs)	*±6 ppm/°C*
Zero drift (A/D specs)	*±1 ppm/°C*
Common mode range	±10 V
CMRR @ 60 Hz	70 dB
Input leakage current	*200 nA*
Input impedance	*10 MOhms, min*
Absolute maximum input voltage	*±35 V*
Noise distribution	Rate = 1-150 kHz, average # bins
	10 V ranges: 3 bins 1 V ranges: 4 bins 0.1 V ranges: 10 bins Bipolar 0.01 V range: 20 bins Unipolar 0.01 V range: 32 bins

Analog output

Table 2. Analog output specifications

Parameter	Specification
D/A type	*AD7847AR*
Resolution	*12 bits*
Number of channels	*2*
Output ranges	±10 V, ±5 V, 0 to 5 V, 0 to 10 V. Each channel independently programmable.
D/A pacing	Software
Data transfer	Programmed I/O
Offset error	±600 µV max, all ranges (calibrated)
Gain error	±0.02% FSR max (calibrated)
Differential nonlinearity	±1 LSB max
Integral nonlinearity	±1 LSB max
Monotonicity	*12 bits*
D/A gain drift	±2 ppm/°C max
D/A bipolar offset drift	±5 ppm/°C max
D/A unipolar offset drift	±5 ppm/°C max
Throughput	PC dependent
Settling time (to 0.01% of 10 V step)	4 µs typ
Slew rate	7 V/µS
Current drive	*±5 mA min*
Output short-circuit duration	*25 mA indefinite*
Output coupling	*DC*
Amp output impedance	*0.1 Ohms max*
Miscellaneous	Power up and reset, all DACs cleared to 0 V, ±200 mV

Digital input/output

Table 3. DIO specifications

Parameter	Specification
Digital type	*82C55A*
Configuration	*2 banks of 8, 2 banks of 4, programmable by bank as input or output*
Number of channels	*24 I/O (FIRSTPORTA 0 through FIRSTPORTC 7)*
Output high	*3.0 V, min @ -2.5 mA*
Output low	*0.4 V, max @ 2.5 mA*
Input high	*2.0 V, min, +5.5 V absolute, max*
Input low	*0.8 V, max, -0.5 V absolute, min*
Power-up / reset state	*Input mode (high impedance)*
Interrupts	INTA# - mapped to IRQn via PCI BIOS at boot-time
Interrupt enable	Programmable
Interrupt sources	Residual counter, end-of-channel-scan, AD-FIFO-not-empty, AD-FIFO-half-full

Counter section

Table 4. Counter specifications

Parameter		Specification
Counter type		*82C54*
Configuration		*Two 82C54 devices. 3 down counters per 82C54, 16 bits each*
82C54A:	Counter 0 - ADC residual sample counter	▪ Source: ADC Clock. ▪ Gate: Internal programmable source. ▪ Output: End-of-Acquisition interrupt.
	Counter 1 - ADC pacer lower divider	▪ Source: 10 MHz oscillator ▪ Gate: tied to counter 2 gate, programmable source. ▪ Output: chained to counter 2 clock.
	Counter 2 - ADC pacer upper divider	▪ Source: counter 1 output. ▪ Gate: Tied to counter 1 gate, programmable source. ▪ Output: ADC pacer clock (if software selected), available at user connector.
82C54B:	Counter 0 - pretrigger mode	▪ Source: ADC clock ▪ Gate: external trigger ▪ Output: End-of-Acquisition interrupt
	Counter 0 - user counter 4 (when in non-pretrigger mode)	▪ Source: User input at 100-pin connector (CLK4) or internal 10 MHz (software selectable) ▪ Gate: user input at 100-pin connector (GATE4) ▪ Output: available at 100-pin connector (OUT4)
	Counter 1 - user counter 5	▪ Source: user input at 100-pin connector (CLK5) ▪ Gate: user input at 100-pin connector (GATE5) ▪ Output: available at 100-pin connector (OUT5)
	Counter 2 - user counter 6	▪ Source: user input at 100-pin connector (CLK6) ▪ Gate: user input at 100-pin connector (GATE6) ▪ Output: available at 100-pin connector (OUT6)
Clock input frequency		*10 MHz max*
High pulse width (clock input)		*30 ns min*
Low pulse width (clock input)		*50 ns min*
Gate width high		*50 ns min*
Gate width low		*50 ns min*
Input low voltage		*0.8 V max*
Input high voltage		*2.0 V min*
Output low voltage		*0.4 V max*
Output high voltage		*3.0 V min*

Power consumption

Table 5. Power consumption specifications

Parameter	Specification
+5 V operating (A/D converting to FIFO)	0.8 A typical, 1.0 A max

Environmental

Table 6. Environmental specifications

Parameter	Specification
Operating temperature range	*0 to 70 °C*
Storage temperature range	*-40 to 100 °C*
Humidity	*0 to 90% non-condensing*

Main connector and pin out

Connector type	100-pin high density Robinson Nugent	
Compatible cable	C100FF-x, unshielded ribbon cable. x = length in feet	
Compatible accessory products (with C100FF-x cable)	ISO-RACK16/P ISO-DA02/P CIO-ERB24 (DADP-5037 adaptor required) CIO-SERB24 (DADP-5037 adaptor required) SSR-RACK24 (DADP-5037 adaptor required)	BNC-16SE BNC-16DI CIO-MINI50 (2 required) CIO-TERM100 (1 required) SCB-50 (1 required)

8-channel differential mode pin out

Pin	Signal Name	Pin	Signal Name
1	LLGND	51	FIRSTPORTA Bit 0
2	CH0 IN HI	52	FIRSTPORTA Bit 1
3	CH0 IN LO	53	FIRSTPORTA Bit 2
4	CH1 IN HI	54	FIRSTPORTA Bit 3
5	CH1 IN LO	55	FIRSTPORTA Bit 4
6	CH2 IN HI	56	FIRSTPORTA Bit 5
7	CH2 IN LO	57	FIRSTPORTA Bit 6
8	CH3 IN HI	58	FIRSTPORTA Bit 7
9	CH3 IN LO	59	FIRSTPORTB Bit 0
10	CH4 IN HI	60	FIRSTPORTB Bit 1
11	CH4 IN LO	61	FIRSTPORTB Bit 2
12	CH5 IN HI	62	FIRSTPORTB Bit 3
13	CH5 IN LO	63	FIRSTPORTB Bit 4
14	CH6 IN HI	64	FIRSTPORTB Bit 5
15	CH6 IN LO	65	FIRSTPORTB Bit 6
16	CH7 IN HI	66	FIRSTPORTB Bit 7
17	CH7 IN LO	67	FIRSTPORTC Bit 0
18	LLGND	68	FIRSTPORTC Bit 1
19	N/C	69	FIRSTPORTC Bit 2
20	N/C	70	FIRSTPORTC Bit 3
21	N/C	71	FIRSTPORTC Bit 4
22	N/C	72	FIRSTPORTC Bit 5
23	N/C	73	FIRSTPORTC Bit 6
24	N/C	74	FIRSTPORTC Bit 7
25	N/C	75	N/C
26	N/C	76	N/C
27	N/C	77	N/C
28	N/C	78	N/C
29	N/C	79	N/C
30	N/C	80	CTR6 CLK
31	N/C	81	CTR6 GATE
32	N/C	82	CTR6 OUT
33	N/C	83	N/C
34	N/C	84	N/C
35	D/A GND 0	85	CTR5 CLK
36	D/A OUT 0	86	CTR5 GATE
37	D/A GND 1	87	CTR5 OUT
38	D/A OUT 1	88	N/C
39	CTR4 CLK	89	GND
40	CTR4 GATE	90	+12V
41	CTR4 OUT	91	GND
42	A/D EXTERNAL PACER	92	-12V
43	N/C	93	N/C
44	N/C	94	N/C
45	A/D EXTERNAL TRIGGER IN	95	A/D INTERNAL PACER OUTPUT
46	N/C	96	N/C
47	N/C	97	N/C
48	PC +5V	98	N/C
49	N/C	99	N/C
50	GND	100	GND

16-channel single-ended mode pin out

Pin	Signal Name	Pin	Signal Name
1	LLGND	51	FIRSTPORTA Bit 0
2	CH0 IN	52	FIRSTPORTA Bit 1
3	CH8 IN	53	FIRSTPORTA Bit 2
4	CH1 IN	54	FIRSTPORTA Bit 3
5	CH9 IN	55	FIRSTPORTA Bit 4
6	CH2 IN	56	FIRSTPORTA Bit 5
7	CH10 IN	57	FIRSTPORTA Bit 6
8	CH3 IN	58	FIRSTPORTA Bit 7
9	CH11 IN	59	FIRSTPORTB Bit 0
10	CH4 IN	60	FIRSTPORTB Bit 1
11	CH12 IN	61	FIRSTPORTB Bit 2
12	CH5 IN	62	FIRSTPORTB Bit 3
13	CH13 IN	63	FIRSTPORTB Bit 4
14	CH6 IN	64	FIRSTPORTB Bit 5
15	CH14 IN	65	FIRSTPORTB Bit 6
16	CH7 IN	66	FIRSTPORTB Bit 7
17	CH15 IN	67	FIRSTPORTC Bit 0
18	LLGND	68	FIRSTPORTC Bit 1
19	N/C	69	FIRSTPORTC Bit 2
20	N/C	70	FIRSTPORTC Bit 3
21	N/C	71	FIRSTPORTC Bit 4
22	N/C	72	FIRSTPORTC Bit 5
23	N/C	73	FIRSTPORTC Bit 6
24	N/C	74	FIRSTPORTC Bit 7
25	N/C	75	N/C
26	N/C	76	N/C
27	N/C	77	N/C
28	N/C	78	N/C
29	N/C	79	N/C
30	N/C	80	CTR6 CLK
31	N/C	81	CTR6 GATE
32	N/C	82	CTR6 OUT
33	N/C	83	N/C
34	N/C	84	N/C
35	D/A GND 0	85	CTR5 CLK
36	D/A OUT 0	86	CTR5 GATE
37	D/A GND 1	87	CTR5 OUT
38	D/A OUT 1	88	N/C
39	CTR4 CLK	89	GND
40	CTR4 GATE	90	+12V
41	CTR4 OUT	91	GND
42	A/D EXTERNAL PACER	92	-12V
43	N/C	93	N/C
44	N/C	94	N/C
45	A/D EXTERNAL TRIGGER IN	95	A/D INTERNAL PACER OUTPUT
46	N/C	96	N/C
47	N/C	97	N/C
48	PC +5V	98	N/C
49	N/C	99	N/C
50	GND	100	GND

CE Declaration of Conformity

Manufacturer: Measurement Computing Corporation
Address: 10 Commerce Way
Suite 1008
Norton, MA 02766
USA

Category: Electrical equipment for measurement, control and laboratory use.

Measurement Computing Corporation declares under sole responsibility that the product

PCI-DAS1001

to which this declaration relates is in conformity with the relevant provisions of the following standards or other documents:

EU EMC Directive 89/336/EEC: Electromagnetic Compatibility, EN55022 (1995), EN55024 (1998)

Emissions: Group 1, Class B

- EN55022 (1995): Radiated and Conducted emissions.

Immunity: EN55024

- EN61000-4-2 (1995): Electrostatic Discharge immunity, Criteria A.
- EN61000-4-3 (1997): Radiated Electromagnetic Field immunity Criteria A.
- EN61000-4-4 (1995): Electric Fast Transient Burst immunity Criteria A.
- EN61000-4-5 (1995): Surge immunity Criteria A.
- EN61000-4-6 (1996): Radio Frequency Common Mode immunity Criteria A.
- EN61000-4-8 (1994): Power Frequency Magnetic Field immunity Criteria A.
- EN61000-4-11 (1994): Voltage Dip and Interrupt immunity Criteria A.

Declaration of Conformity based on tests conducted by Chomerics Test Services, Woburn, MA 01801, USA in September, 2001. Test records are outlined in Chomerics Test Report #EMI3053.01.

We hereby declare that the equipment specified conforms to the above Directives and Standards.

Carl Haapaoja, Director of Quality Assurance

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